

the periphery of said roller wheel, wherein said gear can be used to transfer power from a rotating output shaft to a pinion in a vehicle power assist steering system.

REMARKS

Counsel for applicants thanks Examiner Winner for the courtesy extended on the telephone on March 10, 2003. In light of that discussion, claim 1 has been amended to specifically recite the functional limitation that the novel roller pinion gear of the present invention can be used in a vehicle power assist steering system. Amended formal drawings as requested are submitted herewith.

With regard to the rejection of claims 1 and 2 under 35 U.S.C. §102(b) over U.S. patent 616,525 ("Whitney"), it is respectfully submitted that these claims distinguish over Whitney as Whitney does not teach a roller pinion gear for a vehicle power assist steering system. There is no teaching in Whitney of a gear having the capability of transferring rotary power into a vehicle power assist steering system. In over 100 years since Whitney issued no such gear has been made or used, establishing that Whitney does not anticipate the claimed roller pinion gear. In order to facilitate, rather than hamper, vehicle performance, a vehicle power assist steering system must be small enough to fit into the space in a vehicle engine compartment around the engine, and should also be light weight. The pinion gear used to transfer energy from an output shaft to the assist pinion should also be as efficient as possible. Until the present invention, the increased size, complexity and weight of roller gears with respect to traditional sliding friction worm gears discouraged the use of a roller pinion gear in a vehicle power assist steering system. The increased complexity and weight of a roller gear must be more than offset by the increased efficiency of the system with the roller

pinion gear versus a system with a traditional sliding friction gear. The prior art is devoid of any teaching of a roller pinion gear meeting these criteria.

The present invention surprisingly accomplishes improved power transfer efficiency in a power assist steering system with a roller pinion gear despite the increased complexity of the roller gear. For example, power transfer efficiency greater than 70% at load torques above 200 in-lbf at 1000 rpm can be achieved with a pinion mechanism for a vehicle power assist steering system using the roller pinion gear of the present invention. The prior art is devoid of a teaching of a such a gear, pinion mechanism or power assist steering system as recited in the claims. Therefore, it is respectfully requested that the rejection under 35 U.S.C. §102(b) be reconsidered and withdrawn.

With regard to the rejection of claims 3 - 22 under 35 U.S.C. §103 over U.S. patent 6,164,407 (Cheng) in view of Whitney, it is respectfully requested that this rejection be reconsidered and withdrawn in view of the foregoing and following points, which were also discussed on the telephone on March 10, 2003.

Whitney is over 100 years old. In over 100 years, no one developed a roller pinion gear suitable for use in a power assist steering system. Cheng, filed in 1998, teaches away from the present invention, as it is directed to reducing backlash in the standard sliding-friction-type worm gear mechanisms used in prior art power assist steering systems. Therefore, Cheng cannot be combined with Whitney, as it would defeat the stated goal of Cheng to reduce backlash in such gear mechanism. Further, if it had been obvious to use a roller pinion gear in a power assist steering system, it should have been done long ago. As noted above, the increased complexity and weight

of a roller gear and other engineering considerations would discourage one of ordinary skill in the art from adapting a roller gear to meet the power transfer challenges of a vehicle power assist steering system.

The present inventors discovered a roller pinion gear mechanism suitable for power assist steering applications. Considerable obstacles were overcome to invent a suitable mechanism that can accomplish the claimed function in a power assist steering system.

In view of the foregoing, it is respectfully submitted that all of the claims are in condition for allowance. In the event this amendment does not place the case in condition for allowance, or if there matters that can be resolved over the phone to expedite prosecution, it is requested that the Examiner please telephone the undersigned at (408) 971-0627.

Respectfully submitted,

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APPENDIX

The amended claim is below with any insertions underlined and any deletions in brackets.

1. (amended) A roller pinion gear for use in a power assist steering system, comprising a roller wheel having a plurality of radially projecting teeth about its periphery, wherein said teeth comprise pins rotatably mounted in and projecting from the periphery of said roller wheel, wherein said gear can be used to transfer power from a rotating output shaft to a pinion in a vehicle power assist steering system.